

South Carolina Department of Transportation System Performance Report

Through the federal rulemaking process, the Federal Highway Administration (FHWA) is requiring state DOTs and MPOs (and by extension the South Carolina Department of Transportation (SCDOT) is requiring COGs) to monitor the transportation system using specific performance measures. These measures are associated with the national goal areas prescribed in MAP-21 and the FAST Act. The following System Performance Report describes these national goal areas, rulemakings, performance areas, and prescribed measures. Performance measures have been identified for highway systems, including a set of measures to assess progress toward achieving the goals of the CMAQ Program. The requirements and targets of these measures and tools to calculate them are summarized in this report.

This System Performance Report presents the baseline, performance/condition measures, targets and the progress made towards achieving those targets. These performance measures are a part of SCDOT's Transportation Asset Management Plan (TAMP). SCDOT's TAMP has been developed in a collaborative effort with South Carolina's Division Office of the Federal Highway Administration (FHWA). The plan has been designed to not only satisfy federal rulemaking, but to transcend these requirements by setting 10-year performance estimates for *all* state maintained roads and bridges. By clearly identifying the needs of South Carolina's transportation infrastructure, the TAMP has provided SCDOT a platform to communicate existing infrastructure conditions and project constrained performance targets for SCDOT's physical assets over the next decade. The TAMP supports the primary goals of the agency's Strategic Plan by promoting the most efficient use of limited resources to extend the life of the State's transportation infrastructure.

In 2017, The General Assembly passed legislation (the South Carolina Infrastructure and Economic Development reform Act (Act 40)) to increase the State gas tax by (12) twelve cents by phasing in the increase at (2) two cents per year for (6) six years. These funds are deposited into a new trust fund called the Infrastructure Maintenance Trust Fund (IMTF). These new revenues, coupled with other Federal and State funds, form the financial foundation of SCDOT's Ten Year Plan and performance targets. For the first time in 30 years, the South Carolina Department of Transportation has been provided with an increased and sustainable revenue stream. The "Roads Bill" gives the agency the opportunity to make gradual, but real and significant strides toward bringing the highway system back from three decades of neglect.

The SCDOT's Strategic Plan forms the guiding principles of the agency's Investment Strategies, focusing on the maintenance, preservation and safety of the existing transportation infrastructure, directing investments of highway systems and priority networks, integrating risk-based prioritization, improving safety, advancing lifecycle cost in investment programming and enhancing mobility. The five major goals of the Strategic Plan are:

SCDOT Strategic Plan Goals

- Improve safety programs and outcomes in high risk areas
- Maintain and preserve its existing transportation infrastructure
- Improve program delivery to increase the efficiency and reliability of road and bridge network
- Provide a safe and productive work environment for SCDOT employees
- Earn public trust through transparency, improved communications and audit compliance

The Moving Ahead for Progress in the 21st Century (MAP-21) surface transportation legislation established National Goals and a performance and outcome based program. As part of the program federally established performance measures are set and those targets shall be monitored for progress. There is alignment between SCDOT’s Strategic Plan Goals and the MAP-21 National Goals. The MAP-21 National Goals are as follows:

MAP-21 National Goals

- Safety - To achieve a significant reduction in traffic fatalities and serious injuries on all public roads
- Infrastructure Condition - To maintain the highway infrastructure asset system in a state of good repair
- Congestion Reduction - To achieve a significant reduction in congestion on the National Highway System
- System Reliability - To improve the efficiency of the surface transportation system
- Freight Movement and Economic Vitality - To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development
- Environmental Sustainability - To enhance the performance of the transportation system while protecting and enhancing the natural environment
- Reduced Project Delivery Delays - To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies’ work practices

These goals provide clear asset management performance based direction to support the effective movement of people and goods. Specifically, transportation asset management focuses on preservation of existing infrastructure with a more cost-effective and efficient approach. SCDOT also utilizes transportation asset management principles to address mobility by planning for future demands on the system. These actions facilitate safe and efficient movement of citizens, goods, and services; thereby, enhancing performance of state and national commerce.

This System Performance Report details the federally required (MAP-21/FAST Act) performance measures for a State DOT. The following sections detail the performance measures, baseline and targets and the progress towards those targets based on the most recent Mid-Performance Report that was submitted October 1, 2020.

Highway Safety / PM-1

Effective April 14, 2016 the FHWA established the highway safety performance measures to carry out the Highway Safety Improvement Program (NSIP). Safety performance targets are developed in coordination with the South Carolina Department of Public Safety (SCDPS) and reported annually to FHWA in the state’s Highway Safety Improvement Program (HSIP) Annual Report and to the National Highway Traffic Safety Administration (NHTSA) in the state’s Highway Safety Plan (HSP) developed by SCDPS. The performance measures are:

1. Number of fatalities
2. Rate of fatalities per 100 million vehicle miles traveled
3. Number of serious injuries
4. Rate of serious injuries per 100 million vehicle miles traveled
5. Number of combined non-motorized fatalities and non-motorized serious injuries

The most recently assessed safety targets were for the five year rolling average from 2015 to 2019. South Carolina’s statewide safety performance targets for this time period are included in Table 1, along with actual performance and the state’s baseline data for the (5) five year rolling average from 2013 to 2017. A state is said to have met or made significant progress toward meeting its safety performance targets when at least (4) four of the (5) five targets established under 23 CFR 490.209(a) have been met or the actual outcome is better than the baseline performance. As shown in Table 1 below, South Carolina met or performed better than baseline for 2 of the 5 safety targets. SCDOT continues to implement proven countermeasures addressing the engineering emphasis areas identified in the State’s Strategic Highway Safety Plan (SHSP). For more information regarding the recently updated SHSP, please visit our website here:

https://www.scdot.org/performance/pdf/reports/BR1_SC_SHSP_Dec20_rotated.pdf.

In response to the increasing number of non-motorized user fatalities, SCDOT began developing the state’s first Pedestrian and Bicycle Safety Action Plan in December 2020 and is expected to have a final plan before the end of 2021.

Table 1. South Carolina 2015-2019 Safety Performance Target Assessment						
Performance Measure	2015-2019 Target	2015-2019 Actual	2013-2017 Baseline	Met Target?	Better than Baseline?	Met or Made Significant Progress?
Number of Traffic Fatalities	988.0	1005.0	915.6	No	No	No
Rate of Traffic Fatalities	1.790	1.818	1.752	No	No	
Number of Traffic Serious Injuries	2986.0	2986.6	3108.2	No	Yes	
Rate of Traffic Serious Injuries	5.420	5.412	5.986	Yes	N/A	
Number of Non-motorized Traffic Fatalities & Serious Injuries	380.0	414.2	382.6	No	No	

Table 2 below provides the results of the department’s first Safety Performance Target Assessment for 2014-2018. South Carolina met 4 of the 5 safety targets. During this time period, SCDOT began implementing the state’s Rural Road Safety Program, specifically targeting roadway departure collisions on rural roads.

Table 2. South Carolina 2014-2018 Safety Performance Target Assessment						
Performance Measure	2014-2018 Target	2014-2018 Actual	2012-2016 Baseline	Met Target?	Better than Baseline?	Met or Made Progress?
Number of Traffic Fatalities	970.0	969.6	890.4	Yes	N/A	YES
Rate of Traffic Fatalities	1.810	1.804	1.748	Yes	N/A	
Number of Traffic Serious Injuries	3067.0	2988.4	3195.4	Yes	N/A	
Rate of Traffic Serious Injuries	5.708	5.590	6.304	Yes	N/A	
Number of Non-motorized Traffic Fatalities & Serious Injuries	371.3	389.8	378.8	No	No	

Pavement and Bridge Condition / PM-2

Pavement and bridge performance measures are assessed and reported over a (4) four-year period with the first period beginning on January 1, 2018 and ending December 31, 2021. SCDOT reported baseline targets to FHWA on October 1, 2018. Mid-point (2) two-year performance targets were reported on October 1, 2020 and represented expected pavement and bridge conditions at the end of calendar year 2019. Final (4) four-year performance targets shall be reported on October 1, 2022 and represent expected pavement and bridge condition at the end of calendar year 2021. The second year performance period will begin January 1, 2022 and end December 31, 2025, with additional (4) four-year performance periods to follow. The performance measures are:

1. Percent of Interstate pavements in good condition – (4) four-year target
2. Percent of Interstate pavements in poor condition – (4) four-year target
3. Percent of non-Interstate NHS pavements in good condition – (2) two and (4) four year targets
4. Percent of non-Interstate NHS pavements in poor condition – (2) two and (4) four year targets
5. Percent of NHS bridges by deck area in good condition – (2) two and (4) four year targets
6. Percent of NHS bridges by deck area in poor condition – (2) two and (4) four year targets

MPOs and COGs can elect to establish their own targets or support the statewide targets. The SCDOT statewide PM-2 targets are listed in Table 3.

Table 3 provides a summary of pavement and bridge performance measures. The SCDOT has made measurable and positive progress implementing the strategic priorities of the TAMP that are key to aligning with SCDOT's internal and external efforts towards achievable results. The Ten Year Plan is underway to address infrastructure needs across the state which was initiated in 2017. The plan has seen progress, most notably in the pavement performance measures. At the update of the 2020 Annual Report <https://www.scdot.org/performance/pdf/reports/SCDOT-AnnualReport-2020.pdf> the agency is on target with approximately 80 miles of interstate widening completed or advancing to construction. Widening projects are currently under construction on I-85, I-26 and I-20 and are expected to be completed within the remainder of the final performance period. Interchange improvement projects that are moving forward on interstates include I-85/385, I-26/526 and I-26/I-126/I-20. In addition to widening projects there are preservation and rehabilitation projects that will be under construction to make progress toward the (4) four year targets for pavement condition on the Interstate System.

The (2) two-year performance measure for the percentage of pavements on the non-interstate NHS in good condition was exceeded by 12.5%. The (2) two-year performance target for the non-interstate NHS in poor condition exceeded the target by 0.4%. The SCDOT invested \$63 million above the planned level in 2018 and \$25 million more above the planned level in 2019 to the pavement program. The investment was reflected in the condition performance measure. In 2019 94% of the funding went toward preservation and rehabilitation which have shorter construction durations and were quickly reflected in the performance data contributing to the difference in actual and target values.

To calculate the bridge targets staff analyzed historic National Bridge Inventory (NBI) data and developed a Markov chain analysis to forecast the bridges that would move from Good to Fair and Fair to Poor during the target windows. Staff also collected data from SCDOT Construction and Maintenance offices to determine targets. The SCDOT is in the process of load rating all bridges and developing a new prioritization list that will take into account deck area of bridges on the NHS. The SCDOT fell slightly below the forecasted target of 42.4% at 40% actual for statewide percentage of deck area of bridges on

the NHS classified in Good condition, and above the forecasted target of 4.0% at 4.2% actual for statewide percentage of deck area of bridges on the NHS classified in Poor condition. The difference in actual and forecasted target (2) two-year values is a short term measure that will flatten as the bridge list is finalized and additional bridge replacement and rehabilitation projects are let and construction is completed. The average bridge projects takes (3) three to (4) four years to design and get to contract; therefore, the agency expects to see improvements in the number of load restricted and structurally deficient bridges in years (4) four, (5) five and beyond. Tackling the NHS bridges in Poor condition is a top priority for the SCDOT, and the agency is committed to obtaining long term goals outlined in the Ten Year Plan and meeting performance targets.

Table 3. SCDOT Pavement and Bridge Performance Measures

Performance Measure	Baseline	2-Year Condition/ Performance	2-Year Target	4-Year Target
Percentage of Pavements on the Interstate System in Good Condition		63.2%		71.0%
Percentage of Pavements on the Interstate System in Poor Condition		1.2%		3.0%
Percentage of Pavements of the Non-Interstate NHS in Good Condition	50.4%	54.3%		
Percentage of Pavements of the Non-Interstate NHS in Good Condition (Full Distress + IRI)		27.4%	14.9%	21.1%
Percentage of Pavements of the Non-Interstate NHS in Poor Condition	8.6%	8.4%		
Percentage of Pavements of the Non-Interstate NHS in Poor Condition (Full Distress + IRI)		3.9%	4.3%	4.6%
Percentage of NHS Bridges Classified as in Good Condition	41.1%	40.0%	42.2%	42.7%
Percentage of NHS Bridges Classified as in Poor Condition	4.0%	4.2%	4.0%	6.0%

System Performance, and Freight Movement / PM-3

FHWA established measures to assess the performance and reliability of the National Highway System and freight movement on the interstate. These measures became effective on May 20, 2017 and are as follows:

System Performance Measures

1. Percent of person-miles on the Interstate system that are reliable – (2) two-year and (4) four-year targets
2. Percent of person-miles on the non-Interstate NHS that are reliable – (4) four-year targets
 - Performance measure assesses the reliability of travel time on the Interstate or non-Interstate NHS through the Level of Travel Time Reliability (LOTR). It is ratio of longer travel times (80th percentile) to a normal travel time (50th percentile) over four time periods (AM peak, Mid-day, PM Peak, and weekends) which covers 6AM to 8PM each day. The ratio is expressed as a percentage of the person miles traveled that are reliable through the sum of the number of reliable person miles traveled divided by the sum of total person miles traveled.

Freight Movement Performance Measures

3. Truck Travel Time Reliability (TTTR) – (2) two-year and (4) four-year targets
 - Performance measure is a ratio generated by dividing the longer travel time (95th percentile) by a normal travel time (50th percentile) for each segment of the interstate over five time periods throughout weekdays and weekends (AM Peak, Mid-day, PM peak, weekend and overnight). This performance measure covers all hours of the day. The TTTR's of Interstate segments are then used to create the TTTR index for the entire system using a weighted aggregate calculation for the worst performing times of each segment.

Table 4 displays the results of the performance measures and targets for system performance. The number of Vehicle Miles Traveled (VMT) has an inverse relationship with reliability. The VMT share of unreliable Traffic Message Channel (TMC) in 2019 decreased from the 2017 baseline year and from year 2018 contributing to the difference in actual and projected target (2) two-year values. In addition the effect of significant changes by construction on reliability was not observed over the conservative assumption which also contributed to the difference in values. With interstate improvement projects underway major pinch points will be improved to facilitate the movement of goods and people in our state. In the next (2) two-year target window widening projects, preservation and rehabilitation projects that are currently under construction and planned will make additional progress towards achievement of the projected target. There are consistently unreliable sections on the interstate system that are responsible for making 4.2% of South Carolina's interstates unreliable. The majority of which are located in Charleston, Greenville and Columbia. Addressing these unreliable sections and infrastructure challenges is being accomplished through the management of the Ten Year Plan, the Statewide Transportation Improvement Program (STIP), the Statewide Multimodal Transportation Plan (SMTP), and the Transportation Asset Management Plan (TAMP).

The (2) two-year performance measure for Truck Travel Time Reliability (TTTR) at 1.33 exceeded the target of 1.36. The SCDOT has made addressing congestion at freight bottlenecks a priority to improve operational efficiency and accommodate future traffic volumes. Some of the bottleneck areas with projects currently under construction and/or in planning stages include:

- I-20 / I-77 / Clemson interchanges along with respective bottleneck points along I-20 is currently under construction
- I-77 Widening and Rehabilitation between SC-12 and I-20 / Killian Road
- I-20 / I-126 / I-20 corridor, Carolina Crossroads Project
- US-378 Interchange at Corley Mill Road and I-20
- I-526 Interstate and I-26 Interchange, Leeds Avenue Merge, Paul Cantrell Blvd.
- Woodruff Road / I-385 / I-85
- I-85 / I-385 Gateway
- I-85 from Exit 40 to Exit 69 is currently being widened

In addition to addressing the pinch points the SCDOT Commission approved the Rural Interstate Freight Corridor Project Program in October 2018. The interstate widening program specifically targets the rural sections of the State’s interstate system with a focus on freight mobility. These projects can be found on the SCDOT website under “Interstate Capacity” <https://www.scdot.org/inside/planning-project-prioritization-list.aspx> . This program is in addition to the interstate widening projects planned for urban areas of the state.

Table 4. System Performance Measures, and Freight				
Performance Measure	Baseline	2-Year Condition/ Performance	2-Year Target	4-Year Target
Percent of the Person-Miles Traveled on the Interstate that are Reliable	94.7%	94.8%	91.0%	90.0%
Percent of the Person-Miles Traveled on the Non-Interstate that are Reliable		91.4%		81.0%
Truck Travel Time Reliability Index (TTTR)	1.34	1.33	1.36	1.45

Congestion Mitigation & Air Quality Improvement Program / PM-3

Congestion Mitigation and Air Quality Improvement Program (CMAQ) measures apply to MPOs that are within the boundaries of each U.S. Census Bureau-designated Urbanized Area (UZA) that contains a NHS road, has a population of more than one million, and contains any part of nonattainment or maintenance area for emissions. If applicable the FHWA has established measures, which became effective on May 20, 2017 to assess the following performance measures.

1. CMAQ Only - Annual hours of peak hour excessive delay per capita (PHED) – (4) four-year targets
 - Peak Hour Excessive Delay (PHED) is a measurement of traffic congestion and is expressed as annual hours of peak hour excessive delay per capita. The threshold for excessive delay is based on travel time at 20 miles per hour or 60% of the posted speed limit travel time, whichever is greater, and is measured in 15-minute intervals on National Highway System (NHS) roads. Peak travel hours are defined as 6:00 to 10:00 a.m. on weekday mornings; the weekday afternoon period is 3:00 to 7:00 p.m. or 4:00 to 8:00 p.m. The total excessive delay metric is weighted by vehicle volumes and occupancy. Thus, PHED is a measure of person-hours of delay experienced on NHS roads on an annual basis.
2. CMAQ Only - Percent of non-single occupant vehicle travel (Non-SOV) – (2) two-year and (4) four-year targets
 - Non-Single Occupancy Vehicle (Non-SOV) Travel measures the percent of vehicle travel that occurs with more than one occupant in the vehicle.
3. CMAQ Only - Cumulative two-year and four-year reduction of on-road mobile source emissions for CMAQ funded projects (CMAQ Emission Reduction) – (2) two-year and (4) four-year targets
 - The On-Road Emissions Reduction measure represents the cumulative two-year and four-year emission reductions in kg/day for CMAQ funded projects within the boundaries of the planning area.

Table 5 provides the System Performance Congestion Mitigation and Air Quality Improvement Program. The SCDOT worked in conjunction with NCDOT and the relative MPO to develop the (2) two-year and (4) four-year targets with NCDOT taking the lead on data gathering and analysis due to most of the UZA being located in North Carolina. Trend lines in data have changed with the uncertainty involved with COVID-19 and reduced travel and social distancing practices that have affected travel behavior through the remainder of the performance period. Due to this uncertainty the (4) four-year target was elected to stay at 34.0 annual hours of PHED even though the (2) two-year performance target was reduced.

To develop the Non-SOV travel target a conservative approach was taken based on a trend analysis that was completed. Data used for the measure was developed from the commuting to work data from the American Community Survey. The data fluctuates slightly above 21.0%. The (2) two-year performance is slightly above the (2) two-year target, but in line with the trending data that was expected.

Total Emission reduction for Nitrous Oxide (NOx) and for Volatile Organic Compounds (VOC) performance measures were less than the expected (2) two-year target due to changes in project delivery schedules and a series of challenges encountered by the project management team. Projects that were anticipated to be complete during the 2018-2019 reporting period are now expected to be completed during the next reporting period of 2020-2021. The (4) four-year targets were adjusted accordingly.

Table 5. System Performance Congestion Mitigation & Air Quality Improvement Program					
Performance Measure	Baseline	2-Year Condition/ Performance	2-Year Target	4-Year Target	4-Year Adjustment
Annual Hours of Peak Hour Excessive Delay Per Capita: Urbanized Area 1		14.8		34.0	
Percent of Non-Single Occupancy Vehicle (Non-SOV) Travel: Urbanized Area 1	21.7%	21.6%	21.0%	21.0%	
Total Emission Reductions: NOx	18.800	8.290	58.670	58.964	58.730
Total Emission Reductions: VOC	22.430	11.010	40.820	41.894	46.262